

A NOMENCLATURAL NOTE ON *HASTINGSIA BRACTEOSA*
AND *HASTINGSIA ATROPURPUREA* (LILIACEAE)

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ABSTRACT

Populations of *Hastingsia bracteosa* s.l., including *H. atropurpurea*, were examined for macro-morphological differences, pollen size, viability and surface features, isozyme markers, phenology and color constancy in flowers and capsules. No discontinuity in morphological characters was found. Sympatric, intermediate and interfertile plants suggest the two taxa are too close to maintain as full species, and we propose reducing *H. atropurpurea* to a variety of the earlier name *H. bracteosa*.

In the Illinois River valley of Josephine Co., Oregon, an endemic lily is restricted to serpentine wetlands over a narrow 20 km long zone from Eight Dollar Mt. south to Woodcock Mt. It was described by Sereno Watson in 1885 as *Hastingsia bracteosa* (Proc. Am. Acad. 20:377, 1885) from white-flowered material collected at Eight Dollar Mt. After 1922 it was known as *Schoenolirion bracteosum* (S. Watson) Jepson (Fl. California 1:268, 1922). Peck (1962) noted its flowers were "dull white or purplish," but did not nomenclaturally segregate the species by flower color. Sherman and Becking (1991) argued to maintain the western members of the genus *Schoenolirion* in *Hastingsia*, as is generally done now (Smith & Sawyer 1988; McNeal 1993; Kartesz 1994a,b).

Some related genera (e.g., *Schoenolirion*, *Chlorogalum*) have species easily separable by perianth color (Becking 1986; Sherman 1969), but these taxa are also distinguished by clear morphological differences (e.g., presence or absence of a bulb, inflorescence branching, relative length of inflorescence and leaves).

Becking (1986) split *Hastingsia atropurpurea* Becking from *H. bracteosa* S. Watson based on (1) purple vs. white perianth, (2) largely allopatric ranges, (3) no evidence of hybrids or intermediates, and (4) morphological characters using the dimensions or density of bulb, scape, leaves, glaucousness, leaf venation, floral bracts, inflorescence bracts, raceme branching, and floral density in the racemes.

We found Becking's (1986) morphological data unconvincing and

were unable to validate the reported differences when we measured purple- and white-flowered plants randomly selected in the field (Lang et al. 1994 unpubl. report). Sherman & Becking (1991) used capsule color to discriminate the two taxa of *Hastingsia*, but we found this character did not correlate with flower color, and was variable to some degree with the maturity of the capsule.

Becking (1986, Fig. 2) mapped purple-flowered populations in wetlands south of Tennessee Mt. and white-flowered populations to the north. He noted only a few individuals that violated this pattern, and no populations of intermediates. This geographical segregation of floral color morphs is not as absolute as Becking maintained.

We sampled a north-south transect on the west side of the Illinois River valley, below Tennessee Mt. and Woodcock Mt. We found a gradual or clinal shift in the density of purple corolla pigment over 8 km. In the middle of the range, Zika (1987, unpublished report) discovered a mix of flower color morphs in a fen unknown to Becking at the time of his surveys (Becking 1982, Becking et al. 1982, unpublished reports). This fen supports hundreds of plants with flower colors of all possible extremes and intermediate colors, from purple to pink to white, growing side by side in the same microsites. We observed synchronous flowering and fruiting of all the individuals in this population, with pollinating bees visiting individuals regardless of their corolla color. Pollen viability was high in intermediate plants, as measured by staining with lacto-phenol cotton blue (Lang et al. 1994).

Further studies of surface pollen morphology across the range of both taxa, using SEM photography, showed as much variation within as between populations, and no discernable differences between taxa (Lang et al. 1994). Seed set was uniformly high regardless of flower color, even in the intermediate plants in the zone of sympatry (Lang et al. 1994). Isozyme analysis of ten loci from nine populations (Lang et al. 1994) showed no fixed allelic differences between the two taxa. In short, there was no apparent barrier to gene exchange between individuals with different flower colors.

Nonetheless a strong geographical component correlates with the perianth color extremes. The transition between the two color morphs is in a narrow zone of sympatry despite similar elevation, geology, hydrology, plant community, and other habitat preferences across the combined ranges of the two taxa. For these reasons we believe it is unwarranted to synonymize the two floral color morphs. On the other hand, a strong argument can be made to reduce the rank of *Hastingsia atropurpurea*. Species level morphological differences between the two taxa are essentially absent. All morphometric criteria used by Becking (1986) yield widely overlapping measurements (Lang et al. 1994). Furthermore, large numbers of interfertile and intermediate plants are found where the taxa are

sympatric. We have seen the following Josephine County, OR, specimens which we consider intermediate between *Hastingsia atropurpurea* and *H. bracteosa*:

Darlingtonia fen, 4 km SE of Tennessee Mt., elev. 455 m, T39S R8W S17 SW $\frac{1}{4}$, Zika 10397 OSC, 14 June 1987; same site, F. Lang 1794 OSC, 21 June 1993; Josephine Cr. ca. 3 km S of Tennessee Pass, elev. 510 m, T39S R9W S13 SE $\frac{1}{4}$ of SW $\frac{1}{4}$, J. Greenleaf 1094 OSC, 17 July 1981; *Darlingtonia* fen, E of Woodcock Mt., elev. 535 m, T39S R8W S19 SE $\frac{1}{4}$ of SE $\frac{1}{4}$, B. Mumblo s.n. OSC, 18 July 1984; creek in Westside Valley drainage, [a tributary to] Illinois River, elev. 535 m, T39S R8W S18 NW $\frac{1}{4}$ of SE $\frac{1}{4}$, B. Mumblo s.n. OSC, 18 July 1984; southern Josephine Co., L. Leach s.n. WILLU, 25 June 1930.

Based on the criteria used in Stuessy (1990), we propose reducing the rank of *H. atropurpurea* to a variety rather than a subspecies.

***Hastingsia bracteosa* (S. Wats.) var. *atropurpurea* (Becking) F. Lang & P. Zika, stat. et comb. nov.**—Basionym: *Hastingsia atropurpurea* Becking, Madroño 33:175.—**TYPE:** USA, Oregon, Josephine Co., O'Brien, Woodcock Mt., *Darlingtonia* bog, elev. 1520 ft., 4 July 1984, R. Becking 840700 (holotype, CAS!; isotypes, CAS, DS, GH, HSC, ORE, OSC!, PUA, RSA, SOC!, UBC, US).

Hastingsia bracteosa var. *bracteosa* was formerly a C1 candidate for listing as a federal Endangered Species (1980 Federal Register 45(242): 82480–82569), and faces threats across its limited range from mining, water theft, off-road vehicle use, grazing and development. Based on our investigations, we urge the U. S. Fish & Wildlife Service to place *H. bracteosa* var. *bracteosa* on its Species of Concern list, as it has already done for var. *atropurpurea*. Both varieties are narrow endemics and face the same threats in their limited aggregated habitat.

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